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- (D) allowing said dead-burned magnesium oxide to catalyze cross-linking of said siloxane; and
- (E) shaping said slurry and allowing said shaped slurry to set to form a set gypsum-based, water-resistant board.

2. A method according to claim 1 wherein said magnesium oxide produces a temperature rise of no more than 1 degree Fahrenheit in the Temperature Rise System.

3. A method according to claim 1 wherein said magnesium oxide has a surface area of at least 0.3 square meters per gram as measured by BET.

4. A method according to claim 1 wherein said magnesium oxide has a loss on ignition of less than 0.1% by weight.

5. A method according to claim 1 wherein the amount of magnesium oxide is from about 0.2 to about 0.4 wt % of the gypsum.

6. A method according to claim 1 wherein said siloxane is poly(methyl hydrogen siloxane).

7. A method according to claim 6 wherein said poly (methyl hydrogen siloxane) comprises from about 0.3 to about 1.0 wt. % of the dry ingredients of the set of gypsum board.

8. A method according to claim 6 wherein the quantity of said poly (methyl hydrogen siloxane) is about 0.4 to about 0.8 wt. % of the dry ingredients of the set gypsum board.

9. The method of claim 1 further comprising selecting the siloxane in the siloxane emulsion from the group consisting of a linear, hydrogen-modified siloxane and a cyclic, hydrogen-modified siloxane.

10. A method for making a water-resistant gypsum-based board comprising:

- (A) mixing a quantity of a siloxane fluid with a portion of the gauging water used to prepare said gypsum-based board in a high intensity mixer to form a siloxane/water emulsion in situ;
- (B) mixing a small amount of dead-burned magnesium oxide with calcined gypsum;

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(C) mixing said siloxane/water emulsion with the balance of the gauging water;

(D) mixing said gypsum/magnesium oxide mixture with the siloxane/water mixture of step (C) to form an aqueous slurry;

(E) allowing said dead-burned magnesium oxide to catalyze cross-linking of said siloxane; and

(F) shaping said slurry and allowing said shaped slurry to set to form a set gypsum-based, water resistant board.

11. A method according to claim 10 wherein said siloxane/water emulsion is formed in the absence of an emulsifier.

12. A method according to claim 10 wherein about 25 parts by weight of gauging water are mixed with each part by weight of siloxane in step (A).

13. A method according to claim 10 wherein the amount of magnesium oxide is from about 0.1 to about 0.5 wt % of the gypsum.

14. A method for incorporating siloxane while forming a water-resistant, gypsum-based board, comprising:

(A) mixing a quantity of siloxane fluid with a portion of the gauging water used to prepare said gypsum-based board in a high intensity mixer to form a siloxane emulsion;

(B) mixing said siloxane emulsion with balance of the gauging water, calcined gypsum and from about 0.1 to about 0.5 wt % of the gypsum of dead-burned magnesium oxide to form an aqueous slurry;

(C) allowing said dead-burned magnesium oxide to catalyze cross-linking of said siloxane; and

(D) shaping and allowing said slurry to set to form a set gypsum-based, water-resistant board, said board absorbing less than about 10% of its own weight in water when immersed at 70° F. for two hours in accordance with ASTM Standard 1396 within 24 hours.

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